



SEQUENCE LISTING

<110> INSTITUT PASTEUR
INSTITUT PASTEUR DE TUNIS

<120> GENE ASSOCIATED WITH LEISHMANIA PARASITE VIRULENCE

<130> B4866AI -AD/VMA

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<150> FR 0107985

<151> 2001-06-18

<150> PCT/FR02/02086

<151> 2002-06-17

<160> 10

<170> PatentIn Ver. 2.1

<210> 1

<211> 2094

<212> DNA

<213> Leishmania major

<220>

<221> CDS

<222> (241)..(1674)

<223> LmPDI coding sequence (orf)

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agctgtgagc tgctgcctac tggcaacgtg tacgccattc ccgtttcttg attctgggtgc 180

agtgtctcagc tctaccctat ttgtattgat accgttttcc ttttcgtttt gcaaagaaaa 240

atg cag cgc tca ttc ctt gtt ttt gtt ctg tgc gcc ctt ctc ttc tgc 288

Met Gln Arg Ser Phe Leu Val Phe Val Leu Cys Ala Leu Leu Phe Cys

1

5

10

15

gtc gcg tcc gca gag gtg cag gtg gcc act aag gac aac ttt gac aag 336

Val	Ala	Ser	Ala	Glu	Val	Gln	Val	Ala	Thr	Lys	Asp	Asn	Phe	Asp	Lys	
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gtc	gta	atc	ggg	gat	ctc	acg	ttg	gtc	aag	ttt	tat	gct	ccg	tgg	tgc	384
Val	Val	Ile	Gly	Asp	Leu	Thr	Leu	Val	Lys	Phe	Tyr	Ala	Pro	Trp	Cys	
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ggc	cac	tgc	aag	aca	ctc	gcc	ccg	gag	ttt	gta	aag	gcc	gct	gac	atg	432
Gly	His	Cys	Lys	Thr	Leu	Ala	Pro	Glu	Phe	Val	Lys	Ala	Ala	Asp	Met	
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ctg	gcc	ggc	atc	gcg	acc	ctt	gca	gag	gtc	gat	tgc	acc	aaa	gaa	gag	480
Leu	Ala	Gly	Ile	Ala	Thr	Leu	Ala	Glu	Val	Asp	Cys	Thr	Lys	Glu	Glu	
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Ser	Leu	Ala	Glu	Lys	Tyr	Glu	Ile	Lys	Gly	Phe	Pro	Thr	Leu	Tyr	Ile	
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ttc	cgt	aac	ggg	gag	aaa	gtg	aag	atc	tac	gat	ggg	ccc	cgc	act	gcc	576
Phe	Arg	Asn	Gly	Glu	Lys	Val	Lys	Ile	Tyr	Asp	Gly	Pro	Arg	Thr	Ala	
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gcc	ggc	atc	gcg	tcg	tac	atg	aag	gcg	cat	gtc	ggg	cca	tcg	atg	aag	624
Ala	Gly	Ile	Ala	Ser	Tyr	Met	Lys	Ala	His	Val	Gly	Pro	Ser	Met	Lys	
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gcc	atc	tca	acg	gct	gaa	gag	ctg	gag	gag	ctc	aag	aag	gag	act	ttc	672
Ala	Ile	Ser	Thr	Ala	Glu	Glu	Leu	Glu	Glu	Leu	Lys	Lys	Glu	Thr	Phe	
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ccg	gtg	tgc	gtg	gtg	aag	aca	gcg	agc	acc	gac	tcg	gag	atg	gcg	tcg	720
Pro	Val	Cys	Val	Val	Lys	Thr	Ala	Ser	Thr	Asp	Ser	Glu	Met	Ala	Ser	
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atg	ata	acc	aag	gtg	gcg	gac	tct	ctc	cgc	tcg	cag	atg	aac	ttt	gtg	768
Met	Ile	Thr	Lys	Val	Ala	Asp	Ser	Leu	Arg	Ser	Gln	Met	Asn	Phe	Val	
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ctc	gtg	acg	gat	gcg	gcc	atc	tct	ccg	aat	gat	gcc	atg	gag	tcg	gtt	816
Leu	Val	Thr	Asp	Ala	Ala	Ile	Ser	Pro	Asn	Asp	Ala	Met	Glu	Ser	Val	
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acg	gtg	tat	cgc	aag	aat	gcg	gag	cgc	gag	gcg	tac	acc	ggc	gct	aca	864
Thr	Val	Tyr	Arg	Lys	Asn	Ala	Glu	Arg	Glu	Ala	Tyr	Thr	Gly	Ala	Thr	
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cca atg acg gca gag tcg gtg aag agc ttt ctc acg agt gct gtg ttg	912
Pro Met Thr Ala Glu Ser Val Lys Ser Phe Leu Thr Ser Ala Val Leu	
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gac tac ttt ggc gag ctc ggc cag gag agc ttt cag aag tac atg gaa	960
Asp Tyr Phe Gly Glu Leu Gly Gln Glu Ser Phe Gln Lys Tyr Met Glu	
225 230 235 240	
gcg aac aag gat aaa cct ctt ggg tgg gtg ttc atc gac aag aac acg	1008
Ala Asn Lys Asp Lys Pro Leu Gly Trp Val Phe Ile Asp Lys Asn Thr	
245 250 255	
gat tct gcg ttg aag ggg tca ctt gtg gcg gtg gcg gag aag tac cgc	1056
Asp Ser Ala Leu Lys Gly Ser Leu Val Ala Val Ala Glu Lys Tyr Arg	
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tcg cag gtg ttg cta acc tac att gac ggc gat cag tac cgc ccc gtc	1104
Ser Gln Val Leu Leu Thr Tyr Ile Asp Gly Asp Gln Tyr Arg Pro Val	
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tcg cgc cag ctg ggc att cct gag gat gcg aag ttc ccg gcg ttt gtg	1152
Ser Arg Gln Leu Gly Ile Pro Glu Asp Ala Lys Phe Pro Ala Phe Val	
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gtc gat ttc gag cgc cgc cat cac gtg atg ggg acg gac acc cca gtc	1200
Val Asp Phe Glu Arg Arg His His Val Met Gly Thr Asp Thr Pro Val	
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acc tcc gag tct gtc gct gcg ttt gtg gag aag tat gtc aag ggc gag	1248
Thr Ser Glu Ser Val Ala Ala Phe Val Glu Lys Tyr Val Lys Gly Glu	
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acg aag cag acc gtg atg tcc gac gcg att ccc gct aag gag acg gtg	1296
Thr Lys Gln Thr Val Met Ser Asp Ala Ile Pro Ala Lys Glu Thr Val	
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aac ggc ctc aca acg gtg gtg ggt cag act ttt gcg aag tac acg gac	1344
Asn Gly Leu Thr Thr Val Val Gly Gln Thr Phe Ala Lys Tyr Thr Asp	
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ggc aca caa aac gtg atg ctg ctc ttc tac gcg ccg tgg tgc gga cac	1392
Gly Thr Gln Asn Val Met Leu Leu Phe Tyr Ala Pro Trp Cys Gly His	
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tgc aag aag ctg cac ccc gtc tac gat aaa gta gcc aag agc ttc gag	1440
Cys Lys Lys Leu His Pro Val Tyr Asp Lys Val Ala Lys Ser Phe Glu	
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tct	gag	aat	gtg	atc	att	gcg	aag	atg	gat	gcc	acg	acg	aac	gac	ttt	1488
Ser	Glu	Asn	Val	Ile	Ile	Ala	Lys	Met	Asp	Ala	Thr	Thr	Asn	Asp	Phe	
			405					410					415			

gac	cgc	gag	aag	ttt	gag	gtg	tct	gga	ttt	cca	acg	att	tac	ttc	atc	1536
Asp	Arg	Glu	Lys	Phe	Glu	Val	Ser	Gly	Phe	Pro	Thr	Ile	Tyr	Phe	Ile	
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cca	gcc	ggc	aag	ccg	cca	atc	gtg	tac	gag	ggc	ggc	cgc	acc	gca	gac	1584
Pro	Ala	Gly	Lys	Pro	Pro	Ile	Val	Tyr	Glu	Gly	Gly	Arg	Thr	Ala	Asp	
		435					440					445				

gaa	atc	cag	gtg	ttt	gtg	aag	tct	cac	ctg	acc	gcc	tcc	gcc	gct	cca	1632
Glu	Ile	Gln	Val	Phe	Val	Lys	Ser	His	Leu	Thr	Ala	Ser	Ala	Ala	Pro	
	450					455					460					

tct	ggc	ggc	cct	tcc	ggc	aac	agc	gaa	gag	gaa	gat	ttg	tag			1674
Ser	Gly	Gly	Pro	Ser	Gly	Asn	Ser	Glu	Glu	Glu	Asp	Leu				
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gactgcaagg gatgtggcgt ttataggctg ccctgccttc ccttgctggt tctatgacgg 1734

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<211> 477

<212> PRT

<213> Leishmania major

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Val	Val	Ile	Gly	Asp	Leu	Thr	Leu	Val	Lys	Phé	Tyr	Ala	Pro	Trp	Cys	
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Gly	His	Cys	Lys	Thr	Leu	Ala	Pro	Glu	Phe	Val	Lys	Ala	Ala	Asp	Met	
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Leu	Ala	Gly	Ile	Ala	Thr	Leu	Ala	Glu	Val	Asp	Cys	Thr	Lys	Glu	Glu	
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Ser	Leu	Ala	Glu	Lys	Tyr	Glu	Ile	Lys	Gly	Phe	Pro	Thr	Leu	Tyr	Ile	
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Phe	Arg	Asn	Gly	Glu	Lys	Val	Lys	Ile	Tyr	Asp	Gly	Pro	Arg	Thr	Ala	
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Ala	Ile	Ser	Thr	Ala	Glu	Glu	Leu	Glu	Glu	Leu	Lys	Lys	Glu	Thr	Phe	
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				165					170					175		
Leu	Val	Thr	Asp	Ala	Ala	Ile	Ser	Pro	Asn	Asp	Ala	Met	Glu	Ser	Val	
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Thr	Val	Tyr	Arg	Lys	Asn	Ala	Glu	Arg	Glu	Ala	Tyr	Thr	Gly	Ala	Thr	
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Asp	Tyr	Phe	Gly	Glu	Leu	Gly	Gln	Glu	Ser	Phe	Gln	Lys	Tyr	Met	Glu	
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Ala	Asn	Lys	Asp	Lys	Pro	Leu	Gly	Trp	Val	Phe	Ile	Asp	Lys	Asn	Thr	
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Asp	Ser	Ala	Leu	Lys	Gly	Ser	Leu	Val	Ala	Val	Ala	Glu	Lys	Tyr	Arg	
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Ser Gln Val Leu Leu Thr Tyr Ile Asp Gly Asp Gln Tyr Arg Pro Val
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 Ser Arg Gln Leu Gly Ile Pro Glu Asp Ala Lys Phe Pro Ala Phe Val
 290 295 300
 Val Asp Phe Glu Arg Arg His His Val Met Gly Thr Asp Thr Pro Val
 305 310 315 320
 Thr Ser Glu Ser Val Ala Ala Phe Val Glu Lys Tyr Val Lys Gly Glu
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 Thr Lys Gln Thr Val Met Ser Asp Ala Ile Pro Ala Lys Glu Thr Val
 340 345 350
 Asn Gly Leu Thr Thr Val Val Gly Gln Thr Phe Ala Lys Tyr Thr Asp
 355 360 365
 Gly Thr Gln Asn Val Met Leu Leu Phe Tyr Ala Pro Trp Cys Gly His
 370 375 380
 Cys Lys Lys Leu His Pro Val Tyr Asp Lys Val Ala Lys Ser Phe Glu
 385 390 395 400
 Ser Glu Asn Val Ile Ile Ala Lys Met Asp Ala Thr Thr Asn Asp Phe
 405 410 415
 Asp Arg Glu Lys Phe Glu Val Ser Gly Phe Pro Thr Ile Tyr Phe Ile
 420 425 430
 Pro Ala Gly Lys Pro Pro Ile Val Tyr Glu Gly Gly Arg Thr Ala Asp
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<213> Artificial sequence

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<223> Description of artificial sequence: recombinant protein

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			20					25					30			
Cys	Lys	Thr	Leu	Ala	Pro	Glu	Phe	Val	Lys	Ala	Ala	Asp	Met	Leu	Ala	
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Gly	Ile	Ala	Thr	Leu	Ala	Glu	Val	Asp	Cys	Thr	Lys	Glu	Glu	Ser	Leu	
	50					55					60					
Ala	Glu	Lys	Tyr	Glu	Ile	Lys	Gly	Phe	Pro	Thr	Leu	Tyr	Ile	Phe	Arg	
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Asn	Gly	Glu	Lys	Val	Lys	Ile	Tyr	Asp	Gly	Pro	Arg	Thr	Ala	Ala	Gly	
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Ile	Ala	Ser	Tyr	Met	Lys	Ala	His	Val	Gly	Pro	Ser	Met	Lys	Ala	Ile	
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Cys	Val	Val	Lys	Thr	Ala	Ser	Thr	Asp	Ser	Glu	Met	Ala	Ser	Met	Ile	
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Thr	Asp	Ala	Ala	Ile	Ser	Pro	Asn	Asp	Ala	Met	Glu	Ser	Val	Thr	Val	
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Tyr	Arg	Lys	Asn	Ala	Glu	Arg	Glu	Ala	Tyr	Thr	Gly	Ala	Thr	Pro	Met	
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Thr	Ala	Glu	Ser	Val	Lys	Ser	Phe	Leu	Thr	Ser	Ala	Val	Leu	Asp	Tyr	
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Phe	Gly	Glu	Leu	Gly	Gln	Glu	Ser	Phe	Gln	Lys	Tyr	Met	Glu	Ala	Asn	
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Lys	Asp	Lys	Pro	Leu	Gly	Trp	Val	Phe	Ile	Asp	Lys	Asn	Thr	Asp	Ser	
225					230					235					240	

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Val	Leu	Leu	Thr	Tyr	Ile	Asp	Gly	Asp	Gln	Tyr	Arg	Pro	Val	Ser	Arg	260	265	270	
Gln	Leu	Gly	Ile	Pro	Glu	Asp	Ala	Lys	Phe	Pro	Ala	Phe	Val	Val	Asp	275	280	285	
Phe	Glu	Arg	Arg	His	His	Val	Met	Gly	Thr	Asp	Thr	Pro	Val	Thr	Ser	290	295	300	
Glu	Ser	Val	Ala	Ala	Phe	Val	Glu	Lys	Tyr	Val	Lys	Gly	Glu	Thr	Lys	305	310	315	320
Gln	Thr	Val	Met	Ser	Asp	Ala	Ile	Pro	Ala	Lys	Glu	Thr	Val	Asn	Gly	325	330	335	
Leu	Thr	Thr	Val	Val	Gly	Gln	Thr	Phe	Ala	Lys	Tyr	Thr	Asp	Gly	Thr	340	345	350	
Gln	Asn	Val	Met	Leu	Leu	Phe	Tyr	Ala	Pro	Trp	Cys	Gly	His	Cys	Lys	355	360	365	
Lys	Leu	His	Pro	Val	Tyr	Asp	Lys	Val	Ala	Lys	Ser	Phe	Glu	Ser	Glu	370	375	380	
Asn	Val	Ile	Ile	Ala	Lys	Met	Asp	Ala	Thr	Thr	Asn	Asp	Phe	Asp	Arg	385	390	395	400
Glu	Lys	Phe	Glu	Val	Ser	Gly	Phe	Pro	Thr	Ile	Tyr	Phe	Ile	Pro	Ala	405	410	415	
Gly	Lys	Pro	Pro	Ile	Val	Tyr	Glu	Gly	Gly	Arg	Thr	Ala	Asp	Glu	Ile	420	425	430	
Gln	Val	Phe	Val	Lys	Ser	His	Leu	Thr	Ala	Ser	Ala	Ala	Pro	Ser	Gly	435	440	445	
Gly	Pro	Ser	Gly	Asn	Ser	Glu	Glu	Glu	Asp	Leu	Leu	Glu	His	His	His	450	455	460	
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 <212> PRT
 <213> T. brucei

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 35 40 45
 Gly Tyr Cys Gln Met Leu Ala Pro Glu Trp Glu Lys Ala Ala Asn Glu
 50 55 60
 Thr Ile Asp Asn Ala Leu Met Gly Glu Val Asp Cys His Ser Gln Pro
 65 70 75 80
 Glu Leu Ala Ala Asn Phe Ser Ile Arg Gly Tyr Pro Thr Ile Ile Leu
 85 90 95
 Phe Arg Asn Gly Lys Glu Ala Glu His Tyr Gly Gly Ala Arg Thr Lys
 100 105 110
 Asp Asp Ile Ile Lys Tyr Ile Lys Ala Asn Val Gly Pro Ala Val Thr
 115 120 125
 Pro Ala Ser Asn Ala Glu Glu Val Thr Arg Ala Lys Glu Glu His Asp
 130 135 140
 Val Val Cys Val Gly Leu Thr Ala Asn Asn Ser Thr Ser Leu Ser Thr
 145 150 155 160
 Thr Leu Ala Glu Ala Ala Gln Ser Phe Arg Val Ser Leu Lys Phe Phe
 165 170 175
 Glu Ala Glu Pro Lys Leu Phe Pro Asp Glu Lys Pro Glu Thr Ile Val
 180 185 190
 Val Tyr Arg Lys Gly Gly Glu Lys Glu Val Tyr Asp Gly Pro Met Glu
 195 200 205
 Val Glu Lys Leu Thr Glu Phe Leu Gln Ile Ser Arg Val Ala Phe Gly

210					215					220					
Gly 225	Glu	Ile	Thr	Pro	Glu 230	Asn	Tyr	Gln	Tyr	Tyr 235	Ser	Val	Ile	Lys	Arg 240
Pro	Val	Gly	Trp	Ala 245	Met	Val	Lys	Pro	Asn 250	Glu	Thr	Ala	Ser	Ile	Glu 255
Leu	Lys	Glu	Ser 260	Leu	Thr	Glu	Val	Gly 265	Lys	Lys	Met	Arg	Ser	His	Met 270
Val	Val	Leu 275	Trp	Val	Asn	Ile	Ser 280	Lys	His	Pro	Val	Trp 285	Arg	Asp	Phe
Gly 290	Val	Pro	Glu	Asp	Ala	Lys 295	Tyr	Pro	Ala	Phe	Leu 300	Ala	Ile	His	Trp
Gly 305	Ala	Asn	Tyr	Leu 310	His	Ser	Thr	Ala	Glu	Val 315	Val	Thr	Arg	Glu	Ser 320
Leu	Glu	Lys	Phe 325	Ile	Leu	Glu	Phe	Ala	Ala 330	Gly	Arg	Val	Glu	Pro 335	Thr
Ile	Lys	Ser	Leu 340	Pro	Val	Pro	Glu	Val 345	Glu	Thr	Val	Asp	Gly 350	Lys	Thr
Thr	Ile	Val 355	Ala	Lys	Thr	Met	Gln 360	Lys	His	Leu	Thr	Ser 365	Gly	Lys	Asp
Met 370	Leu	Ile	Leu	Phe	Phe	Ala 375	Pro	Trp	Cys	Gly	His 380	Cys	Lys	Asn	Phe
Ala 385	Pro	Thr	Phe	Asp	Lys 390	Ile	Ala	Lys	Glu	Phe 395	Asp	Ala	Thr	Asp	Leu 400
Ile	Val	Ala	Glu 405	Leu	Asp	Ala	Thr	Ala 410	Asn	Tyr	Val	Asn	Ser	Ser 415	Thr
Phe	Thr	Val 420	Thr	Ala	Phe	Pro	Thr	Val 425	Phe	Phe	Val	Pro	Asn 430	Gly	Gly
Lys	Pro	Val 435	Val	Phe	Glu	Gly	Glu 440	Arg	Ser	Phe	Glu 445	Asn	Val	Tyr	Glu
Phe 450	Val	Arg	Lys	His	Val	Thr 455	Thr	Phe	Lys	Val	Ser 460	Glu	Lys	Pro	Ala

Asn Val Thr Glu Glu Lys Lys Ser Glu Glu Glu Asn Lys Ser Ser Lys
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Ser Asn Glu Ser Asn Asp Ser Asn Glu Ser Asn Val Asp Lys Gln Asp
 485 490 495

Leu

<210> 5

<211> 502

<212> PRT

<213> H. jecorina

<400> 5

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Asn Asp Phe Ile Asn Ser Asn Asp Leu Val Leu Ala Glu Ser Phe Ala
 35 40 45

Pro Trp Cys Gly His Cys Lys Ala Leu Ala Pro Glu Tyr Glu Glu Ala
 50 55 60

Ala Thr Thr Leu Lys Asp Lys Ser Ile Lys Leu Ala Lys Val Asp Cys
 65 70 75 80

Val Glu Glu Ala Asp Leu Cys Lys Glu His Gly Val Glu Gly Tyr Pro
 85 90 95

Thr Leu Lys Val Phe Arg Gly Leu Asp Lys Val Ala Pro Tyr Thr Gly
 100 105 110

Pro Arg Lys Ala Asp Gly Ile Thr Ser Tyr Met Val Lys Gln Ser Leu
 115 120 125

Pro Ala Val Ser Ala Leu Thr Lys Asp Thr Leu Glu Asp Phe Lys Thr
 130 135 140

Ala Asp Lys Val Val Leu Val Ala Tyr Ile Ala Ala Asp Asp Lys Ala
 145 150 155 160

Ser	Asn	Glu	Thr	Phe	Thr	Ala	Leu	Ala	Asn	Glu	Leu	Arg	Asp	Thr	Tyr	
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Leu	Phe	Gly	Gly	Val	Asn	Asp	Ala	Ala	Val	Ala	Glu	Ala	Glu	Gly	Val	
			180					185					190			
Lys	Phe	Pro	Ser	Ile	Val	Leu	Tyr	Lys	Ser	Phe	Asp	Glu	Gly	Lys	Asn	
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Val	Phe	Ser	Glu	Lys	Phe	Asp	Ala	Glu	Ala	Ile	Arg	Asn	Phe	Ala	Gln	
	210					215					220					
Val	Ala	Ala	Thr	Pro	Leu	Val	Gly	Glu	Val	Gly	Pro	Glu	Thr	Tyr	Ala	
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Gly	Tyr	Met	Ser	Ala	Gly	Ile	Pro	Leu	Ala	Tyr	Ile	Phe	Ala	Glu	Thr	
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Ala	Glu	Glu	Arg	Glu	Asn	Leu	Ala	Lys	Thr	Leu	Lys	Pro	Val	Ala	Glu	
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Lys	Tyr	Lys	Gly	Lys	Ile	Asn	Phe	Ala	Thr	Ile	Asp	Ala	Lys	Asn	Phe	
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Phe	Ala	Ile	His	Asp	Ile	Glu	Lys	Asn	Leu	Lys	Phe	Pro	Phe	Asp	Gln	
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Ser	Lys	Glu	Ile	Thr	Glu	Lys	Asp	Ile	Ala	Ala	Phe	Val	Asp	Gly	Phe	
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Ser	Ser	Gly	Lys	Ile	Glu	Ala	Ser	Ile	Lys	Ser	Glu	Pro	Ile	Pro	Glu	
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Thr	Gln	Glu	Gly	Pro	Val	Thr	Val	Val	Val	Ala	His	Ser	Tyr	Lys	Asp	
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Ile	Val	Leu	Asp	Asp	Lys	Lys	Asp	Val	Leu	Ile	Glu	Phe	Tyr	Thr	Pro	
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Trp	Cys	Gly	His	Cys	Lys	Ala	Leu	Ala	Pro	Lys	Tyr	Asp	Glu	Leu	Ala	
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Ser	Leu	Tyr	Ala	Lys	Ser	Asp	Phe	Lys	Asp	Lys	Val	Val	Ile	Ala	Lys	
				405					410					415		

Val Asp Ala Thr Ala Asn Asp Val Pro Asp Glu Ile Gln Gly Phe Pro
 420 425 430
 Thr Ile Lys Leu Tyr Pro Ala Gly Asp Lys Lys Asn Pro Val Thr Tyr
 435 440 445
 Ser Gly Ala Arg Thr Val Glu Asp Phe Ile Glu Phe Ile Lys Glu Asn
 450 455 460
 Gly Lys Tyr Lys Ala Gly Val Glu Ile Pro Ala Glu Pro Thr Glu Glu
 465 470 475 480
 Ala Glu Ala Ser Glu Ser Lys Ala Ser Glu Glu Ala Lys Ala Ser Glu
 485 490 495
 Glu Thr His Asp Glu Leu
 500

<210> 6
 <211> 488
 <212> PRT
 <213> C. elegans

<400> 6
 Met Ile Trp Val Gln Ala Ala Leu Val Ala Ser Phe Leu Ala Phe Ala
 1 5 10 15
 Ser Ala Gly Gly Ala Val Leu Glu Tyr Thr Asp Gly Asn Phe Asp Asp
 20 25 30
 Leu Ile Gln Thr His Asp Ile Ala Leu Val Lys Phe Tyr Ala Pro Trp
 35 40 45
 Cys Gly His Cys Lys Lys Ile Ala Pro Glu Tyr Glu Arg Ala Ala Pro
 50 55 60
 Lys Leu Ala Ser Asn Asp Pro Pro Val Ala Leu Val Lys Val Asp Cys
 65 70 75 80
 Thr Thr Glu Lys Thr Val Cys Asp Lys Phe Gly Val Lys Gly Phe Pro
 85 90 95
 Thr Leu Lys Ile Phe Arg Asn Gly Val Pro Ala Gln Asp Tyr Asp Gly
 100 105 110

Pro	Arg	Asp	Ala	Asp	Gly	Ile	Val	Lys	Phe	Met	Arg	Gly	Gln	Ser	Gly	
115		120						125								
Pro	Ser	Ser	Lys	Glu	Leu	Lys	Thr	Val	Ala	Glu	Phe	Glu	Lys	Phe	Thr	
130		135						140								
Gly	Gly	Asp	Glu	Asn	Val	Val	Ile	Gly	Phe	Phe	Glu	Ser	Glu	Ser	Lys	
145					150		155								160	
Leu	Lys	Asp	Ser	Tyr	Leu	Lys	Val	Ala	Asp	Thr	Glu	Arg	Asp	Arg	Phe	
				165		170				175						
Ser	Phe	Ala	His	Thr	Ser	Asn	Lys	Asp	Ile	Ile	Lys	Lys	Ala	Gly	Tyr	
				180		185				190						
Ser	Asp	Asp	Val	Val	Val	Phe	Val	Pro	Lys	Lys	Leu	His	Asn	Lys	Phe	
195		200						205								
Asp	Thr	Asn	Glu	Phe	Lys	Tyr	Asp	Gly	Asn	Tyr	Asp	Thr	Asp	Lys	Ile	
210						215		220								
Lys	Asn	Phe	Leu	Val	His	Glu	Thr	Val	Gly	Phe	Ala	Gly	Ile	Arg	Thr	
225					230		235								240	
Gln	Gly	Asn	Leu	Phe	Gln	Phe	Glu	Gln	Lys	Pro	Ile	Val	Ile	Val	Tyr	
				245		250				255						
Tyr	Asn	Val	Asp	Tyr	Val	Lys	Asp	Pro	Lys	Gly	Ser	Asn	Tyr	Trp	Arg	
			260		265				270							
Asn	Arg	Val	Leu	Lys	Val	Ala	Gln	Asn	Tyr	Lys	Arg	Lys	Val	Gln	Phe	
275		280						285								
Ala	Val	Ser	Asn	Lys	Glu	Glu	Phe	Ser	Ser	Glu	Ile	Glu	Thr	Asn	Gly	
290						295		300								
Leu	Gly	Glu	Arg	Lys	Asp	Ser	Asp	Lys	Pro	Ile	Val	Ala	Ile	Leu	Thr	
305					310		315								320	
Asn	Glu	Gly	Lys	Tyr	Pro	Met	Asp	Gln	Glu	Phe	Ser	Val	Asp	Asn	Leu	
				325		330				335						
Gln	Gln	Phe	Val	Asp	Glu	Val	Leu	Ala	Gly	Asn	Ala	Glu	Pro	Tyr	Met	
			340		345				350							

Lys Ser Glu Pro Ile Pro Asp Glu Gln Gly Asp Val Lys Val Ala Val
 355 360 365
 Gly Lys Asn Phe Lys Glu Leu Ile Met Asp Ala Asp Lys Asp Val Leu
 370 375 380
 Ile Glu Phe Tyr Ala Pro Trp Cys Gly His Cys Lys Ser Leu Ala Pro
 385 390 395 400
 Lys Tyr Glu Glu Leu Ala Glu Lys Leu Asn Lys Glu Asp Val Ile Ile
 405 410 415
 Ala Lys Met Asp Ala Thr Ala Asn Asp Val Pro Pro Met Phe Glu Val
 420 425 430
 Arg Gly Phe Pro Thr Leu Phe Trp Leu Pro Lys Asn Ala Lys Ser Asn
 435 440 445
 Pro Ile Pro Tyr Asn Gly Gly Arg Glu Val Lys Asp Phe Val Ser Phe
 450 455 460
 Ile Ser Lys His Ser Thr Asp Gly Leu Lys Gly Phe Ser Arg Asp Gly
 465 470 475 480
 Lys Lys Lys Lys Lys Thr Glu Leu
 485

<210> 7
 <211> 532
 <212> PRT
 <213> C. reinhard

<400> 7
 Met Asn Arg Trp Asn Leu Leu Ala Leu Thr Leu Gly Leu Leu Leu Val
 1 5 10 15
 Ala Ala Pro Phe Thr Lys His Gln Phe Ala His Ala Ser Asp Glu Tyr
 20 25 30
 Glu Asp Asp Glu Glu Asp Asp Ala Pro Ala Ala Pro Lys Asp Asp Asp
 35 40 45
 Val Asp Val Thr Val Val Thr Val Lys Asn Trp Asp Glu Thr Val Lys
 50 55 60

Lys	Ser	Lys	Phe	Ala	Leu	Val	Glu	Phe	Tyr	Ala	Pro	Trp	Cys	Gly	His	65	70	75	80
Cys	Lys	Thr	Leu	Lys	Pro	Glu	Tyr	Ala	Lys	Ala	Ala	Thr	Ala	Leu	Lys	85	90	95	
Ala	Ala	Ala	Pro	Asp	Ala	Leu	Ile	Ala	Lys	Val	Asp	Ala	Thr	Gln	Glu	100	105	110	
Glu	Ser	Leu	Ala	Gln	Lys	Phe	Gly	Val	Gln	Gly	Tyr	Pro	Thr	Leu	Lys	115	120	125	
Trp	Phe	Val	Asp	Gly	Glu	Leu	Ala	Ser	Asp	Tyr	Asn	Gly	Pro	Arg	Asp	130	135	140	
Ala	Asp	Gly	Ile	Val	Gly	Trp	Val	Lys	Lys	Lys	Thr	Gly	Pro	Pro	Ala	145	150	155	160
Val	Thr	Val	Glu	Asp	Ala	Asp	Lys	Leu	Lys	Ser	Leu	Glu	Ala	Asp	Ala	165	170	175	
Glu	Val	Val	Val	Val	Gly	Tyr	Phe	Lys	Ala	Leu	Glu	Gly	Glu	Ile	Tyr	180	185	190	
Asp	Thr	Phe	Lys	Ser	Tyr	Ala	Ala	Lys	Thr	Glu	Asp	Val	Val	Phe	Val	195	200	205	
Gln	Thr	Thr	Ser	Ala	Asp	Val	Ala	Lys	Ala	Ala	Gly	Leu	Asp	Ala	Val	210	215	220	
Asp	Thr	Val	Ser	Val	Val	Lys	Asn	Phe	Ala	Gly	Glu	Asp	Arg	Ala	Thr	225	230	235	240
Ala	Val	Leu	Ala	Thr	Asp	Ile	Asp	Thr	Asp	Ser	Leu	Thr	Ala	Phe	Val	245	250	255	
Lys	Ser	Glu	Lys	Met	Pro	Pro	Thr	Ile	Glu	Phe	Asn	Gln	Lys	Asn	Ser	260	265	270	
Asp	Lys	Ile	Phe	Asn	Ser	Gly	Ile	Asn	Lys	Gln	Leu	Ile	Leu	Trp	Thr	275	280	285	
Thr	Ala	Asp	Asp	Leu	Lys	Ala	Asp	Ala	Glu	Ile	Met	Thr	Val	Phe	Arg	290	295	300	
Glu	Ala	Ser	Lys	Lys	Phe	Lys	Gly	Gln	Leu	Val	Phe	Val	Thr	Val	Asn				

305					310					315					320
Asn	Glu	Gly	Asp	Gly	Ala	Asp	Pro	Val	Thr	Asn	Phe	Phe	Gly	Leu	Lys
				325					330					335	
Gly	Ala	Thr	Ser	Pro	Val	Leu	Leu	Gly	Phe	Phe	Met	Glu	Lys	Asn	Lys
			340					345					350		
Lys	Phe	Arg	Met	Glu	Gly	Glu	Phe	Thr	Ala	Asp	Asn	Val	Ala	Lys	Phe
		355					360					365			
Ala	Glu	Ser	Val	Val	Asp	Gly	Thr	Ala	Gln	Ala	Val	Leu	Lys	Ser	Glu
	370					375					380				
Ala	Ile	Pro	Glu	Asp	Pro	Tyr	Glu	Asp	Gly	Val	Tyr	Lys	Ile	Val	Gly
385					390					395					400
Lys	Thr	Val	Glu	Ser	Val	Val	Leu	Asp	Glu	Thr	Lys	Asp	Val	Leu	Leu
				405					410					415	
Glu	Val	Tyr	Ala	Pro	Trp	Cys	Gly	His	Cys	Lys	Lys	Leu	Glu	Pro	Ile
			420					425					430		
Tyr	Lys	Lys	Leu	Ala	Lys	Arg	Phe	Lys	Lys	Val	Asp	Ser	Val	Ile	Ile
		435					440					445			
Ala	Lys	Met	Asp	Gly	Thr	Glu	Asn	Glu	His	Pro	Glu	Ile	Glu	Val	Lys
	450					455					460				
Gly	Phe	Pro	Thr	Ile	Leu	Phe	Tyr	Pro	Ala	Gly	Ser	Asp	Arg	Thr	Pro
465					470					475					480
Ile	Val	Phe	Glu	Gly	Gly	Asp	Arg	Ser	Leu	Lys	Ser	Leu	Thr	Lys	Phe
				485					490					495	
Ile	Lys	Thr	Asn	Ala	Lys	Ile	Pro	Tyr	Glu	Leu	Pro	Lys	Lys	Gly	Ser
			500					505					510		
Asp	Gly	Asp	Glu	Gly	Thr	Ser	Asp	Asp	Lys	Asp	Lys	Pro	Ala	Ser	Asp
		515					520					525			
Lys	Asp	Glu	Leu												
	530														

<210> 8

<211> 496

<212> PRT

<213> D. melano

<400> 8

Met	Lys	Phe	Leu	Ile	Cys	Ala	Leu	Phe	Leu	Ala	Ala	Ser	Tyr	Val	Ala
1				5					10					15	

Ala	Ser	Ala	Glu	Ala	Glu	Val	Lys	Val	Glu	Glu	Gly	Val	Leu	Val	Ala
			20					25					30		

Thr	Val	Asp	Asn	Phe	Lys	Gln	Leu	Ile	Ala	Asp	Asn	Glu	Phe	Val	Leu
		35					40					45			

Val	Glu	Phe	Tyr	Ala	Pro	Trp	Cys	Gly	His	Cys	Lys	Ala	Leu	Ala	Pro
	50					55					60				

Glu	Tyr	Ala	Lys	Ala	Ala	Gln	Gln	Leu	Ala	Glu	Lys	Glu	Ser	Pro	Ile
65					70					75					80

Lys	Leu	Ala	Lys	Val	Asp	Ala	Thr	Val	Glu	Gly	Glu	Leu	Ala	Glu	Gln
				85					90					95	

Tyr	Ala	Val	Arg	Gly	Tyr	Pro	Thr	Leu	Lys	Phe	Phe	Arg	Ser	Gly	Ser
			100					105					110		

Pro	Val	Glu	Tyr	Ser	Gly	Gly	Arg	Gln	Ala	Ala	Asp	Ile	Ile	Ala	Trp
		115					120					125			

Val	Thr	Lys	Lys	Thr	Gly	Pro	Pro	Ala	Lys	Asp	Leu	Thr	Ser	Val	Ala
	130					135					140				

Asp	Ala	Glu	Gln	Phe	Leu	Lys	Asp	Asn	Glu	Ile	Ala	Ile	Ile	Gly	Phe
145					150					155					160

Phe	Lys	Asp	Leu	Glu	Ser	Glu	Glu	Ala	Lys	Thr	Phe	Thr	Lys	Val	Ala
				165					170					175	

Asn	Ala	Leu	Asp	Ser	Phe	Val	Phe	Gly	Val	Ser	Ser	Asn	Ala	Asp	Val
			180					185					190		

Ile	Ala	Lys	Tyr	Glu	Ala	Lys	Asp	Asn	Gly	Val	Val	Leu	Phe	Lys	Pro
		195					200					205			

Phe	Asp	Asp	Lys	Lys	Ser	Val	Phe	Glu	Gly	Glu	Leu	Asn	Glu	Glu	Asn
	210					215					220				

Leu	Lys	Lys	Phe	Ala	Gln	Val	Gln	Ser	Leu	Pro	Leu	Ile	Val	Asp	Phe	225	230	235	240
Asn	His	Glu	Ser	Ala	Ser	Lys	Ile	Phe	Gly	Gly	Ser	Ile	Lys	Ser	His	245	250	255	
Leu	Leu	Phe	Phe	Val	Ser	Arg	Glu	Gly	Gly	His	Ile	Glu	Lys	Tyr	Val	260	265	270	
Asp	Pro	Leu	Lys	Glu	Ile	Ala	Lys	Lys	Tyr	Arg	Asp	Asp	Ile	Leu	Phe	275	280	285	
Val	Thr	Ile	Ser	Ser	Asp	Glu	Glu	Asp	His	Thr	Arg	Ile	Phe	Glu	Phe	290	295	300	
Phe	Gly	Met	Asn	Lys	Glu	Glu	Val	Pro	Thr	Ile	Arg	Leu	Ile	Lys	Leu	305	310	315	320
Glu	Glu	Asp	Met	Ala	Lys	Tyr	Lys	Pro	Glu	Ser	Asp	Asp	Leu	Ser	Ala	325	330	335	
Glu	Thr	Ile	Glu	Ala	Phe	Leu	Lys	Lys	Phe	Leu	Asp	Gly	Lys	Leu	Lys	340	345	350	
Gln	His	Leu	Leu	Ser	Gln	Glu	Leu	Pro	Glu	Asp	Trp	Asp	Lys	Asn	Pro	355	360	365	
Val	Lys	Val	Leu	Val	Ser	Ser	Asn	Phe	Glu	Ser	Val	Ala	Leu	Asp	Lys	370	375	380	
Ser	Lys	Ser	Val	Leu	Val	Glu	Phe	Tyr	Ala	Pro	Trp	Cys	Gly	His	Cys	385	390	395	400
Lys	Gln	Leu	Ala	Pro	Ile	Tyr	Asp	Gln	Leu	Ala	Glu	Lys	Tyr	Lys	Asp	405	410	415	
Asn	Glu	Asp	Ile	Val	Ile	Ala	Lys	Met	Asp	Ser	Thr	Ala	Asn	Glu	Leu	420	425	430	
Glu	Ser	Ile	Lys	Ile	Ser	Ser	Phe	Pro	Thr	Ile	Lys	Tyr	Phe	Arg	Lys	435	440	445	
Glu	Asp	Asn	Lys	Val	Ile	Asp	Phe	Asn	Leu	Asp	Arg	Thr	Leu	Asp	Asp	450	455	460	
Phe	Val	Lys	Phe	Leu	Asp	Ala	Asn	Gly	Glu	Val	Ala	Asp	Ser	Glu	Pro	465	470	475	480

Val	Glu	Glu	Thr	Glu	Glu	Glu	Glu	Glu	Ala	Pro	Lys	Lys	Asp	Glu	Leu
				485					490					495	

<210> 9
 <211> 481
 <212> PRT
 <213> C. parvum

Met	Ile	Gly	Ile	Arg	Ser	Leu	Val	Ser	Ala	Ala	Phe	Leu	Gly	Phe	Ser
1				5					10					15	
Cys	Leu	Ser	Lys	Val	Val	Leu	Gly	Gly	Asp	Glu	Ala	His	Phe	Ile	Ser
			20					25					30		
Glu	His	Ile	Thr	Ser	Leu	Thr	Ser	Ser	Asn	Phe	Glu	Asp	Phe	Ile	Lys
		35					40					45			
Ser	Lys	Glu	His	Val	Ile	Val	Thr	Phe	Phe	Ala	Pro	Trp	Cys	Gly	His
	50					55					60				
Cys	Thr	Ala	Leu	Glu	Pro	Glu	Phe	Lys	Ala	Thr	Cys	Ala	Glu	Ile	Ser
65					70					75				80	
Lys	Leu	Ser	Pro	Pro	Val	His	Cys	Gly	Ser	Val	Asp	Ala	Thr	Glu	Asn
				85					90					95	
Met	Glu	Leu	Ala	Gln	Gln	Tyr	Gly	Val	Ser	Gly	Tyr	Pro	Thr	Ile	Lys
			100					105					110		
Phe	Phe	Ser	Gly	Ile	Asp	Ser	Val	Gln	Asn	Tyr	Ser	Gly	Ala	Arg	Ser
		115					120					125			
Lys	Asp	Ala	Phe	Ile	Lys	Tyr	Ile	Lys	Lys	Leu	Thr	Gly	Pro	Ala	Val
	130					135					140				
Gln	Val	Ala	Glu	Ser	Glu	Glu	Ala	Ile	Lys	Thr	Ile	Phe	Ala	Ser	Ser
145					150					155				160	
Ser	Ser	Ala	Phe	Val	Gly	Arg	Phe	Thr	Ser	Lys	Asp	Ser	Ala	Glu	Tyr
				165					170					175	

Ala Val Phe Glu Lys Val Ala Ser Gly His Arg Glu His Asn Tyr Ala
180 185 190

Phe Ile Ala Phe Phe Gln Glu Gly Glu Gln Lys Leu Glu Val Leu His
195 200 205

Lys Asp Glu Glu Pro Val Ser Leu Pro Met Pro Lys Thr Val Glu Glu
210 215 220

Leu Glu Ala Lys Ile Ser Ile Met Asn Val Pro Leu Phe Ser Ala Ile
225 230 235 240

Ser Ala Glu Asn Tyr Ser Leu Tyr Met Ser Arg Glu Gly Tyr Thr Pro
245 250 255

Gly Ser Val Val Leu Thr Arg Thr Ser Pro Ser Met Leu Gln Thr Leu
260 265 270

Glu Arg Leu Gln Leu Ile Thr Glu Lys Ser Met Pro Leu Phe Ser Leu
275 280 285

Asp Thr Glu Gln Phe Gly Ser His Ala Thr Gln His Leu Leu Ile Glu
290 295 300

Lys Phe Pro Gly Leu Val Ile Gln Ser Val Asn Val Pro Ser Ile Arg
305 310 315 320

Tyr Met Tyr Gly Pro Ala Lys Phe Asp Ser Val Glu Pro Leu Lys Glu
325 330 335

Phe Met Lys Gln Val Ser Glu Gly Lys His Glu Leu Ser Ile Lys Ser
340 345 350

Glu Pro Ile Pro Ala Glu Gln Ser Gly Pro Val Thr Val Val Val Gly
355 360 365

Lys Thr Phe Glu Glu Ile Val Phe Arg Ser Asp Lys Asp Val Leu Leu
370 375 380

Glu Ile Tyr Ala Gln Trp Cys Gly His Cys Lys Asn Leu Glu Pro Ile
385 390 395 400

Tyr Asn Gln Leu Gly Glu Glu Tyr Lys Asp Asn Asp Lys Val Val Ile
405 410 415

Ala Lys Ile Asn Gly Pro Gln Asn Asp Ile Pro Tyr Glu Gly Phe Ser

420

425

430

Pro Arg Ala Phe Pro Thr Ile Leu Phe Val Lys Ala Gly Thr Arg Thr
 435 440 445

Pro Ile Pro Tyr Asp Gly Lys Arg Thr Val Glu Ala Phe Lys Glu Phe
 450 455 460

Ile Ser Glu His Ser Ser Phe Pro Gln Glu Lys Glu Ser Arg Asp Glu
 465 470 475 480

Leu

<210> 10

<211> 508

<212> PRT

<213> Homo sapiens

<400> 10

Met Leu Arg Arg Ala Leu Leu Cys Leu Ala Val Ala Ala Leu Val Arg
 1 5 10 15

Ala Asp Ala Pro Glu Glu Glu Asp His Val Leu Val Leu Arg Lys Ser
 20 25 30

Asn Phe Ala Glu Ala Leu Ala Ala His Lys Tyr Leu Leu Val Glu Phe
 35 40 45

Tyr Ala Pro Trp Cys Gly His Cys Lys Ala Leu Ala Pro Glu Tyr Ala
 50 55 60

Lys Ala Ala Gly Lys Leu Lys Ala Glu Gly Ser Glu Ile Arg Leu Ala
 65 70 75 80

Lys Val Asp Ala Thr Glu Glu Ser Asp Leu Ala Gln Gln Tyr Gly Val
 85 90 95

Arg Gly Tyr Pro Thr Ile Lys Phe Phe Arg Asn Gly Asp Thr Ala Ser
 100 105 110

Pro Lys Glu Tyr Thr Ala Gly Arg Glu Ala Asp Asp Ile Val Asn Trp
 115 120 125

Leu Lys Lys Arg Thr Gly Pro Ala Ala Thr Thr Leu Pro Asp Gly Ala

130		135		140
Ala 145	Ala Glu Ser Leu Val	Glu Ser Ser Glu Val	Ala Val Ile Gly Phe	160
Phe 165	Lys Asp Val Glu Ser Asp Ser Ala Lys Gln Phe Leu Gln Ala Ala			175
Glu 180	Ala Ile Asp Asp Ile Pro Phe Gly Ile Thr Ser Asn Ser Asp Val			190
Phe 195	Ser Lys Tyr Gln Leu Asp Lys Asp Gly Val Val Leu Phe Lys Lys			205
Phe 210	Asp Glu Gly Arg Asn Asn Phe Glu Gly Glu Val Thr Lys Glu Asn			220
Leu 225	Leu Asp Phe Ile Lys His Asn Gln Leu Pro Leu Val Ile Glu Phe			240
Thr 245	Glu Gln Thr Ala Pro Lys Ile Phe Gly Gly Glu Ile Lys Thr His			255
Ile 260	Leu Leu Phe Leu Pro Lys Ser Val Ser Asp Tyr Asp Gly Lys Leu			270
Ser 275	Asn Phe Lys Thr Ala Ala Glu Ser Phe Lys Gly Lys Ile Leu Phe			285
Ile 290	Phe Ile Asp Ser Asp His Thr Asp Asn Gln Arg Ile Leu Glu Phe			300
Phe 305	Gly Leu Lys Lys Glu Glu Cys Pro Ala Val Arg Leu Ile Thr Leu			320
Glu 325	Glu Glu Met Thr Lys Tyr Lys Pro Glu Ser Glu Glu Leu Thr Ala			335
Glu 340	Arg Ile Thr Glu Phe Cys His Arg Phe Leu Glu Gly Lys Ile Lys			350
Pro 355	His Leu Met Ser Gln Glu Leu Pro Glu Asp Trp Asp Lys Gln Pro			365
Val 370	Lys Val Leu Val Gly Lys Asn Phe Glu Asp Val Ala Phe Asp Glu			380

Lys Lys Asn Val Phe Val Glu Phe Tyr Ala Pro Trp Cys Gly His Cys
 385 390 395 400

Lys Gln Leu Ala Pro Ile Trp Asp Lys Leu Gly Glu Thr Tyr Lys Asp
 405 410 415

His Glu Asn Ile Val Ile Ala Lys Met Asp Ser Thr Ala Asn Glu Val
 420 425 430

Glu Ala Val Lys Val His Ser Phe Pro Thr Leu Lys Phe Phe Pro Ala
 435 440 445

Ser Ala Asp Arg Thr Val Ile Asp Tyr Asn Gly Glu Arg Thr Leu Asp
 450 455 460

Gly Phe Lys Lys Phe Leu Glu Ser Gly Gly Gln Asp Gly Ala Gly Asp
 465 470 475 480

Asp Asp Asp Leu Glu Asp Leu Glu Glu Ala Glu Glu Pro Asp Met Glu
 485 490 495

Glu Asp Asp Asp Gln Lys Ala Val Lys Asp Glu Leu
 500 505